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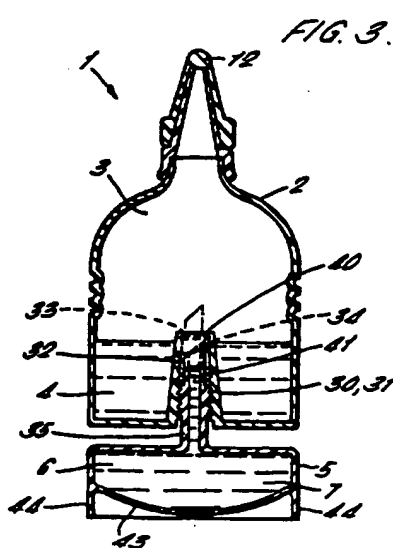
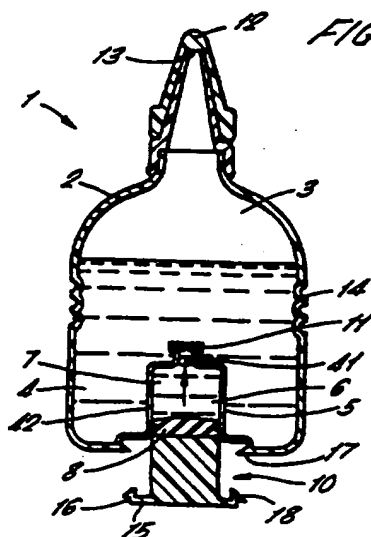
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(56) Documents Cited
GB 1521446 A GB 1258845 A US 5209565 A
US 4193698 A US 4174035 A US 4102451 A

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(54) Abstract Title
A dispenser having two compartments

(57) A dispenser comprises first and second containers 2, 5 for storing first and second components 4, 7 prior to mixing. There is a first outlet means 13 allowing dispensing from the first container 2, conduit means 41 connecting the first and second containers 2, 5 and sealing means 11 for sealing the conduit means 41. The apparatus also has manually operable means for opening the sealing means to allow the second component to flow from the second container into the first container so that a mixture can be formed and dispensed. At least part of the second container is movable relative to the first container and comprises at least part of the manually operable means. The sealing means may be a frangible membrane and the manually operable means may be a tine capable of breaking the membrane (Figure 1 A). The first and second containers may be interengaged by means of a screw thread. The sealing means may be a one way valve (Figure 2). The second container may have a syringe 10 with a plunger 8 for applying pressure to a stopper 11 in order to dislodge the stopper which acts as the sealing means. The first and second containers may be squeeze-bottles. The first and second containers may be elliptical in cross-section.



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FIG. 1.

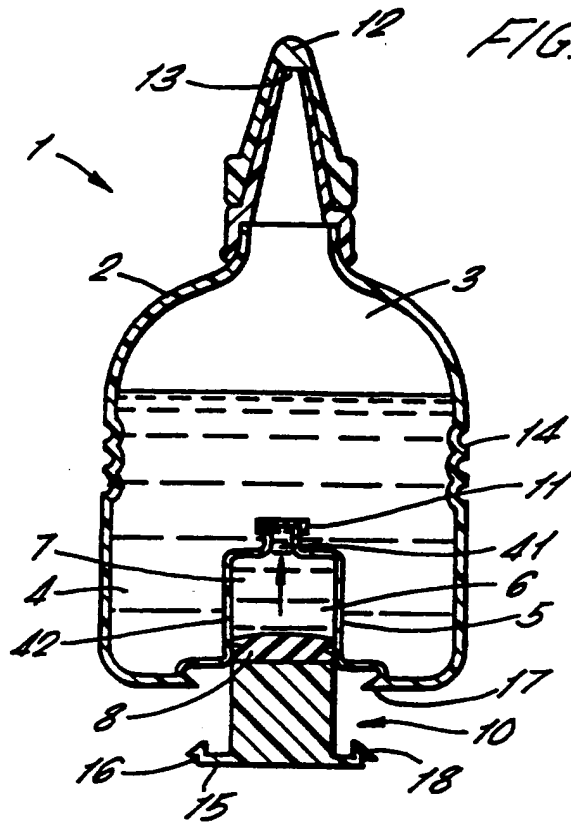


FIG. 2.

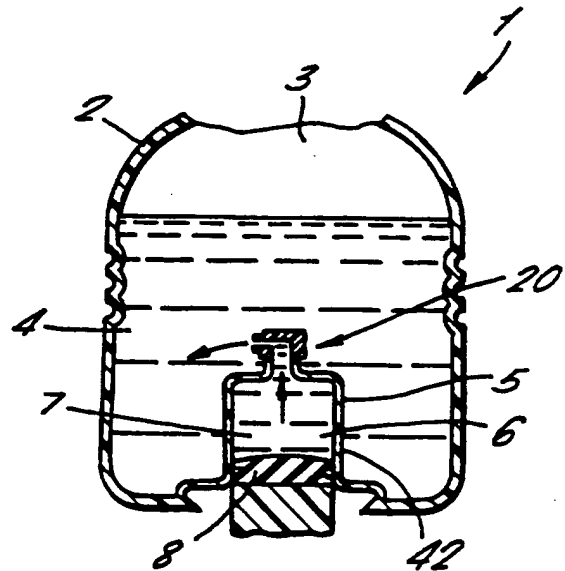


FIG. 1A.

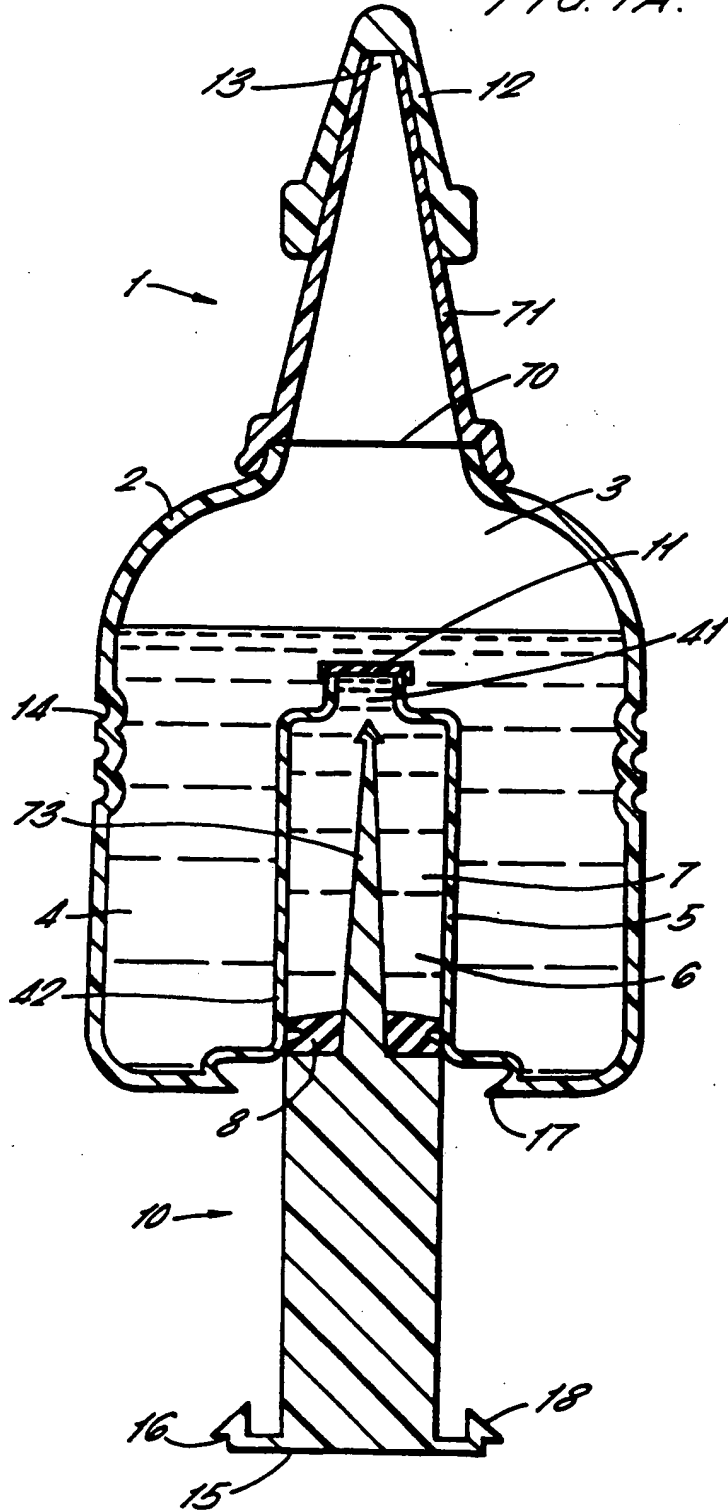


FIG. 1B.

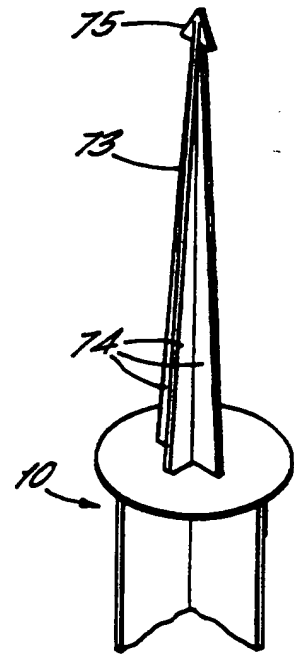


FIG. 3.

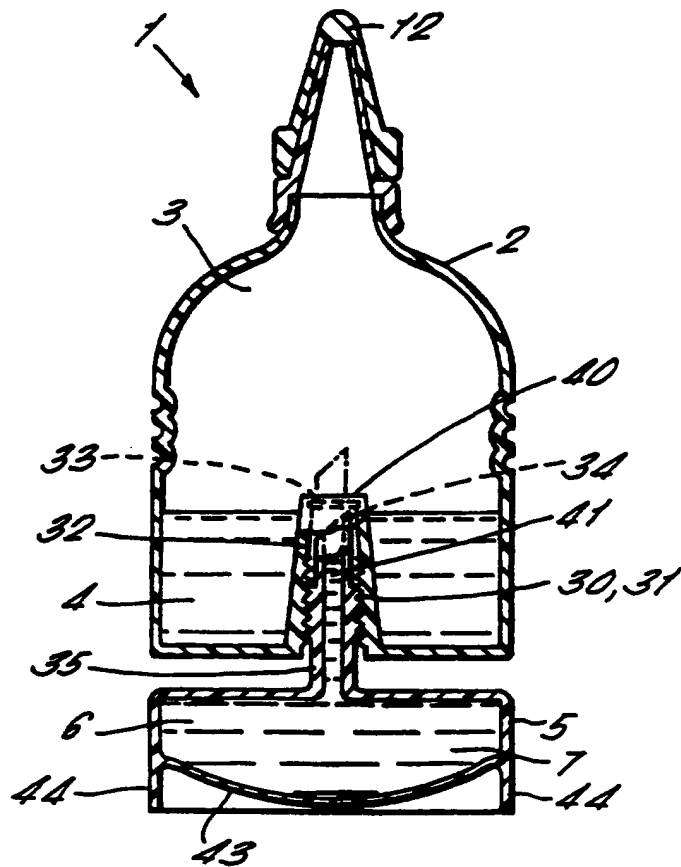
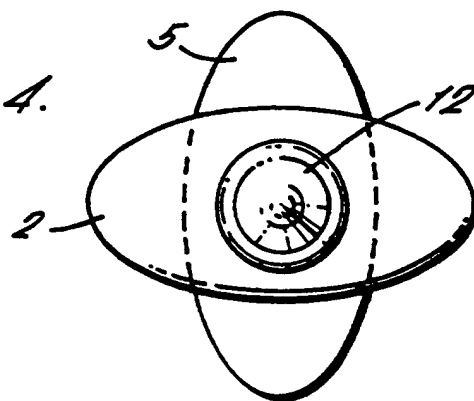


FIG. 4.



TWO COMPARTMENT DISPENSER

5 This invention relates to an apparatus for
separately storing and subsequently mixing two
components of a substance to be dispensed.

10 Dual compartment dispenses for pharmaceutical,
cosmetic and other fluid preparations typically
comprise a chamber receiving a liquid and a separate
compartment for a powder or liquid which is required
to be separately stored until immediately prior to use
of the mixture, this being particularly necessary
where the mixture degrades rapidly with age.

15 Some known arrangements rely upon a seal being
penetrated by a needle to initiate mixing, such
arrangements being complex and requiring assembly from
numerous components.

20 It is also known from US-A-4614267 to provide a
vial which can be manually opened by manipulation
through the sides of a flexible container within which
it extends. Such an arrangement is, however,
25 unsuitable to most applications where rigid or semi-
rigid containers are required.

30 It is therefore an object of the present
invention to provide an inexpensive, simple to use
apparatus for storing and subsequently mixing two
components of a substance to be dispensed.

35 The present invention therefore provides
apparatus for separately storing and subsequently
mixing first and second components of a mixture to be

dispensed, the apparatus comprising:-

- 5 a first container for the first component prior to mixing;
- 5 a second container for the second component prior to mixing;
- first outlet means allowing dispensing from the first container;
- 10 conduit means connecting the first and second containers; and
- sealing means for sealing the conduit means; wherein
- the apparatus comprises manually operable means for opening the sealing means to allow the second
- 15 component to flow from the second container along the conduit means to the first container to be mixed with the first component in the first container to form the mixture which is subsequently dispensed via the first outlet means; and
- 20 at least a part of the second container is movable relative to the first container and comprises at least a part of the manually operable means for opening the sealing means.
- 25 Preferably the sealing means is a frangible membrane, said manually operable means comprises a tine on the second housing capable of breaking said frangible seal and the tine is provided as a part of the second container movable relative to the first
- 30 container.

In a first embodiment the first and second containers are inter-engaged by means of mating screw-

35 threads, the second container can be moved relative to

the first container by rotation of the second container relative to the first container and the sealing means can be opened by rotating the second container relative to the first container.

5

Alternatively the sealing means comprises a valve biased into a closed position, said manually operable means comprises means for applying pressure on the second component, which pressure is applied via the second component to said valve and opens said valve; and said valve permits transmission in only one direction, from the second container to the first container.

10

15

Alternatively the sealing means comprises a stopper and said manually operable means comprises means for applying pressure on the second component, which pressure is applied via the second component to said valve and causes the stopper to be displaced from a sealing position thereby establishing communication between the first and second containers.

20

In a second embodiment the second container comprises a syringe having a plunger and an outlet, the plunger of the syringe being axially slidable relative to the first container and providing the means for applying pressure to the second component.

25

Preferably a part of the syringe and the first housing are formed integrally.

30

Optionally the first container comprises a sealing membrane separating the first component from the first outlet means prior to mixing; a spike coupled to the plunger of the syringe aligned to

35

pierce the sealing membrane as the plunger of the syringe slides axially relative to the first container to allow the mixture of the first and second components to be dispensed via the first outlet means.

5

Preferably the spike comprise one or more axial ribs.

10 Preferably the first and second components comprise liquids.

15 The apparatus may be used for medicinal preparations or other liquids which require mixing shortly before use, such as some adhesives for example.

Alternatively the first component comprises a solid and the second component comprises a liquid.

20 The apparatus can also be used to mix a powder and a liquid. Preferably the powder would be initially stored in the first container and the liquid in the second container.

25 It is desired that the second container comprises a flexible part which can be flexed to encourage flow of the second component from the second housing into the first housing.

30 Advantageously either or both of the first and second containers are elliptical in cross-section.

35 Either embodiment may be adapted so that the second container comprises means for fixedly engaging with the first container on axial movement of the

second container or the movable part thereof towards the first housing in order to prevent further axial movement away from the first housing.

5 Preferably the engaging means comprises an enlarged rim depending from a circular flange in the exterior of the second container, the rim comprises a ramped surface contactable in use with a lip of the first container to deform the rim to allow the rim to
10 move past the lip, subsequent reformation of the shape of the rim preventing the rim moving back past the lip to thereby prevent further axial movement away from the first container.

15 In this way the movement of the second container (or a part thereof) relative to the first container is prevented once mixing of the two components is achieved. This helps to prevent liquid being drawn
20 back into the second housing and also to prevent the containers from becoming separated which could lead to leakage of the liquid.

 Preferred embodiments of the present invention will now be described by way of example only and with
25 reference to the accompanying drawings, of which:-

 Figure 1 is a sectioned elevation of a first embodiment of the present invention;
 Figure 1A is a sectioned elevation of an adaption
30 of the first embodiment of the present invention;
 Figure 1B is a perspective view of a part of the adaption of Figure 1A;
 Figure 2 is a sectioned elevation of part of an adaptation of the first embodiment of the present
35 invention;

Figure 3 is a sectioned elevation of a second embodiment of the present invention;

Figure 4 is a top plan view of the second embodiment of the present invention;

5

A first embodiment of the apparatus 1, as shown in Figures 1 and 2, comprises a first container 2 defining a first chamber 3 in which a first liquid component 4 is stored and a second container 5
10 defining a second chamber 6 in which a second liquid component 7 is stored. Alternatively, the first chamber 3 may hold a solid component and the second chamber 6 a liquid component.

15 The second container 5 takes the form of a syringe 10 comprising a cylindrical portion 42 extending within the first chamber 3, a plunger 8 and an outlet 41. The plunger 8 of the syringe extends externally from the first container 2. The outlet 41
20 of the syringe 10 opens into the first chamber 3 and before depression of the plunger 8 is sealed by a tip seal 11. The tip seal 11 may be of a conventional type formed from an elastomer or other suitable material and is of a kind that may be dislodged by increased
25 hydraulic pressure of the liquid in the syringe 10. The second chamber 6 may be filled with the second liquid component 7 before the plunger 8 is inserted in the cylindrical portion 42 or via the outlet 41 after the plunger 8 is inserted.

30

The first container 2 takes the form of a bottle having a nozzle opening 13 in an upper end. The first chamber 3 may be filled via the nozzle opening 13 or via the outlet 41 of the second container 5 before the
35 outlet 41 is sealed.

A releasable overcap 12 covers and seals the nozzle opening 13 of the first container 2. The overcap 12 may be screw-fitted onto the first container 2 or may be a snap-fit.

5

Preferably the cylindrical portion 42 of the syringe 10 and the first housing 2 are formed integrally.

10 Preferably, the first container 2 has an axial portion comprising circumferential corrugations 14. The corrugations 14 allow the first housing 2 to expand in volume as liquid is displaced from the second chamber 6 into the first chamber 3 without an
15 unacceptable increase in the hydraulic pressure of the liquid. The first housing 2 is manufactured from a flexible semi-rigid material such as certain plastics in order that the first and second components when
20 mixed may be dispensed through the nozzle opening 13 by means of squeezing the first container 2.

 In use, a user of the apparatus 1 axially moves the plunger 8 towards the outlet 41 of the first container 2 causing the tip seal 11 to be disengaged
25 from the outlet 41 by means of increased hydraulic pressure in the second liquid component 7 due to the decrease in volume of the second chamber 6 as the plunger 8 is depressed. Further depression of the plunger 8 causes the second liquid component 7 to be
30 displaced into the first chamber 3 where it mixes with the first liquid component 4. Mixing of the two components may be aided by shaking the apparatus 1.

 Preferably, the plunger 8 comprises a circular
35 flange 15 at an end distal from the first container 2.

This provides a secure grip to a user of the device and eases the depression of the plunger 8.

Preferably, the circular flange 15 comprises an enlarged rim 16 depending from a surface of the flange 15 nearest the first container 2. The rim 16 is provided with a ramped surface 18. When the syringe 8 is fully moved towards the first container 2, the ramped surface 18 of the enlarged rim 16 contacts a circumferential lip 17 of the first container 2 causing the rim 16 to be deformed inwardly to allow the rim 16 to move past the lip 17. Once past the lip 17 the rim 16 resumes its normal shape. The lack of a ramped surface on the face of the rim 16 opposite the lip 17 prevents the rim 16 moving back past the lip 17. In this way further axial movement of the second container 5 relative to the first container 2 is restricted. This feature prevents the syringe 10 being withdrawn from the first container 2 once mixing has been accomplished which might lead to mixed liquid being drawn back into the syringe 10 and therefore not dispensed from the first container 2 when it is squeezed.

Alternatively, the tip seal 11 may be replaced by an elastomeric sleeve 20 as shown in Figure 2. The sleeve 20 acts as a one-way valve, normally biased into the sealed position but movable to an unsealed position, by means of increased hydraulic pressure of the liquid in the first chamber 6 as the plunger 8 is depressed, to permit liquid under pressure to flow from the second housing 5 into the first housing 2 but preventing liquid from flowing in the reverse direction. A conventional elastomeric one-way sleeve would be suitable for this application.

35

Optionally a sealing membrane 70 may be inserted transversely across the first container 2 separating the contents of the first chamber 3 from the nozzle opening 13 as shown in Figure 1A. The purpose of the sealing membrane 70 is to prevent dispensing of the first component 4 before the first and second components 4 and 6 have been mixed. Preferably the sealing membrane 70 is held in position between the body of the first container 2 and a top section 71 of the first container 2 housing the nozzle opening 13. Alternatively the sealing membrane may be bonded to the inner surface of the first container 2. The sealing membrane is ideally thin and manufactured from a material such as an elastomer, plastic or metallic foil.

Where a sealing membrane is included in the apparatus 1 the syringe 10 is further provided with a spike 73. The spike 73 extends upwardly from the plunger 8 and before use of the apparatus 1 rests entirely within the second chamber 6. In use, when the user depresses the plunger 8 to transfer the first component 4 into the second chamber 3, the spike 73 moves axially with the plunger and pierces the sealing membrane 70 to allow the resulting mixture of liquids to be dispensed via the nozzle opening 13.

Preferably the spike 73 is provided with axial ribs 74 such that the cross-section of the spike 73 has a cruciform shape as shown in Figure 1B. The ribs 74 ensure that the spike 73 pierces the sealing membrane 70 in such a way that the mixture of liquids may pass through the sealing membrane 70 more easily. Optionally the tip 75 of the spike 73 has a barb thereon to pierce a larger hole in the sealing

membrane 70 to allow easier dispensing of the mixture.

In a second embodiment of the present invention as shown in Figures 3 and 4, the first and second
5 containers 2 and 5 comprise squeeze-bottles. The first container 2 is formed from a rigid material and the second container 5 is formed from a mixture of rigid, semi-rigid or flexible materials. The contents of the first and second chambers 3 and 6 are as described in
10 the first embodiment of the invention. The first and second containers 2 and 5 are provided with inter-engaging screw-thread formations 30 and 31. The second container 5 comprises an external screw-thread 31 on a tubular extension 35 and the first container 2
15 comprises an internal screw-thread 30 on an internal cylindrical extension 32. An inlet 40 of the first container 2 comprises a frangible seal 33 at a distal end of the cylindrical extension 32. The frangible seal 33 also acts to seal an outlet 41 of the second
20 housing 5.

In use, a user of the apparatus 1 rotates the second housing 5 relative to the first housing 2 causing the second housing 5 to move axially towards
25 the first housing 2 due to the direction of ramping on the screw-threads 30, 31. The frangible seal 33 is pierced by an end 34 of the second housing 5. Preferably, the end 34 is shaped to form a tine to more easily break the frangible seal 33. Once the
30 frangible seal 33 is broken fluid communication between the second container 5 and first container 2 is possible.

Preferably the first container 2 comprises an
35 axial portion with corrugations as described in the

first embodiment of the invention described above.

Alternatively the first container 2 comprises small vents at or near the neck or top of the container to allow excess pressure to be released from the first container 2 as the second component 7 is transferred into the first chamber 3. A further alternative where the first container 2 comprises a top section 71 and a body portion, the top section 71 being joined to the body portion by means of screw thread formations 80, is to provide the screw thread formations 80 with small axial grooves passing through the threads to provide an air path from the first chamber 3 that would prevent over-pressurisation of the first container 2.

The rigid material of the first container 2 prevents the dispensing of the first component 4 before it is mixed with the second component 7 since the first container 2 can not be squeezed. This is advantageous where the first component 4 may be harmful to the user before it is mixed with the second component 7.

The second container 5 comprises a flexible base 43 and rigid side walls 44. In use the base 43 would be flexed to displace the second component 7 from the second container 5 into the first housing where mixing would result. The rigid side walls 44 provide a stable means of standing the apparatus 1 on a flat surface. Furthermore the flexible base 43 provides a means for dispensing the mixture of liquids through the nozzle opening 13 as droplets by means of a user 'pumping' the flexible base 43 to urge the mixture through the nozzle opening 13 at relatively high speed.

Preferably, the first container 2 and second container 5 have an elliptical cross-section as shown in Figure 4. Such a flattened elliptical shape is easier to grip and rotate by a user of the apparatus 1 than a perfectly round cross-section.

The frangible seal 33 could be replaced by a one-way elastomeric valve as in the first embodiment of the invention described above.

CLAIMS:

1. Apparatus for separately storing and subsequently
5 mixing first and second components of a mixture to be
dispensed, the apparatus comprising:-

a first container for the first component prior
to mixing;
10 a second container for the second component prior
to mixing;
first outlet means allowing dispensing from the
first container;
conduit means connecting the first and second
15 containers; and
sealing means for sealing the conduit means;
wherein
the apparatus comprises manually operable means
for opening the sealing means to allow the second
20 component to flow from the second container along the
conduit means to the first container to be mixed with
the first component in the first container to form the
mixture which is subsequently dispensed via the first
outlet means; and
25 at least a part of the second container is
movable relative to the first container and comprises
at least a part of the manually operable means for
opening the sealing means.

- 30 2. Apparatus as claimed in claim 1, wherein the
sealing means is a frangible membrane, said manually
operable means comprises a tine on the second housing
capable of breaking said frangible seal and the tine
is provided as a part of the second container movable
35 relative to the first container.

3. Apparatus as claimed in claim 1 or claim 2,
wherein the first and second containers are inter-
engaged by means of mating screw-threads, the second
5 container can be moved relative to the first container
by rotation of the second container relative to the
first container and the sealing means can be opened by
rotating the second container relative to the first
container.
- 10
4. Apparatus as claimed in claim 1, wherein the
sealing means comprises a valve biased into a closed
position, said manually operable means comprises means
for applying pressure on the second component, which
15 pressure is applied via the second component to said
valve and opens said valve; and said valve permits
transmission in only one direction, from the second
container to the first container.
- 20
5. Apparatus as claimed in claim 1, wherein the
sealing means comprises a stopper and said manually
operable means comprises means for applying pressure
on the second component, which pressure is applied via
the second component to said valve and causes the
25 stopper to be displaced from a sealing position
thereby establishing communication between the first
and second containers.
- 30
6. Apparatus as claimed in claims 4 or 5, wherein
the second container comprises a syringe having a
plunger and an outlet, the plunger of the syringe
being axially slidable relative to the first container
and providing the means for applying pressure to the
second component.

35

7. Apparatus as claimed in claim 6 wherein a part of the syringe and the first housing are formed integrally.

5 8. Apparatus as claimed in either of claims 6 or 7 wherein the first container comprises a sealing membrane separating the first component from the first outlet means prior to mixing; a spike coupled to the plunger of the syringe aligned to pierce the sealing
10 membrane as the plunger of the syringe slides axially relative to the first container to allow the mixture of the first and second components to be dispensed via the first outlet means.

15 9. Apparatus as claimed in claim 8 wherein the spike comprise one or more axial ribs.

10. Apparatus as claimed in any preceding claim, wherein the first and second components comprise
20 liquids.

11. Apparatus as claimed in any of claims 1 to 10, wherein the first component comprises a solid and the second component comprises a liquid.
25

12. Apparatus as claimed in any of claims 1 to 4 or 7 to 11, wherein the second container comprises a flexible part which can be flexed to encourage flow of the second component from the second housing into the
30 first housing.

13. Apparatus as claimed in any preceding claim, wherein either or both of the first and second containers are elliptical in cross-section.
35

14. Apparatus as claimed in claim 2 or claim 3,
wherein the second container comprises means for
fixedly engaging with the first container on axial
movement of the second container or the movable part
5 thereof towards the first housing in order to prevent
further axial movement away from the first housing.

15. Apparatus as claimed in claim 14 wherein the
engaging means comprises an enlarged rim depending
10 from a circular flange in the exterior of the second
container, the rim comprises a ramped surface
contactable in use with a lip of the first container
to deform the rim to allow the rim to move past the
lip, subsequent reformation of the shape of the rim
15 preventing the rim moving back past the lip to thereby
prevent further axial movement away from the first
container.

16. Apparatus substantially as hereinbefore described
20 with reference to and as shown in the accompanying
drawings.

ST17741/2



Application No: GB 9805221.0
Claims searched: all

Examiner: Dr. Claire L Williams
Date of search: 3 June 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8D (DSC1, DSR1, DSR2)

Int Cl (Ed.6): B65D

Other: ONLINE: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 1521446 (U PELIZZARI) in particular Figure 3	1, 2, 11, 12, 14
Y	GB 1258845 (WOLF GERATE) in particular Figure 1	1, 2, 10
Y	US 5209565 (OREAL) all of the Figures and in particular features 6 and 7.	1, 2, 10, 11, 12, 14
Y	US 4193698 (GARTNER) in particular Figures 1 - 3	1, 2, 12, 14
Y	US 4174035 (WIEGNER) in particular Figure 1	1, 2, 12
X	US 4102451 (LILLY) in particular Figures 1 and 2.	1, 5, 11

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